ORDER NO. MEW/CLD 7904-19

2151

Service Manual

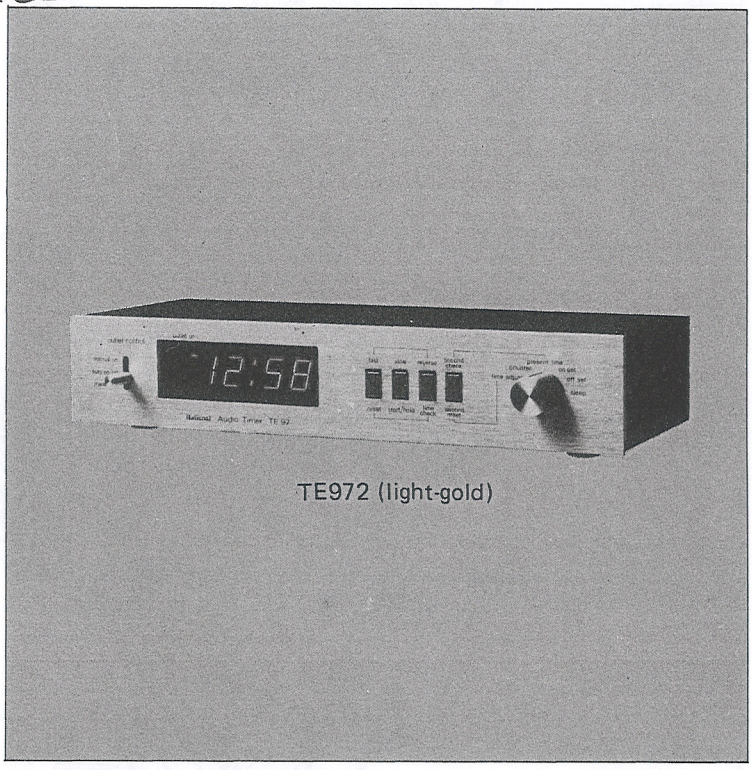
Audio Timer

TE 97,972

Original

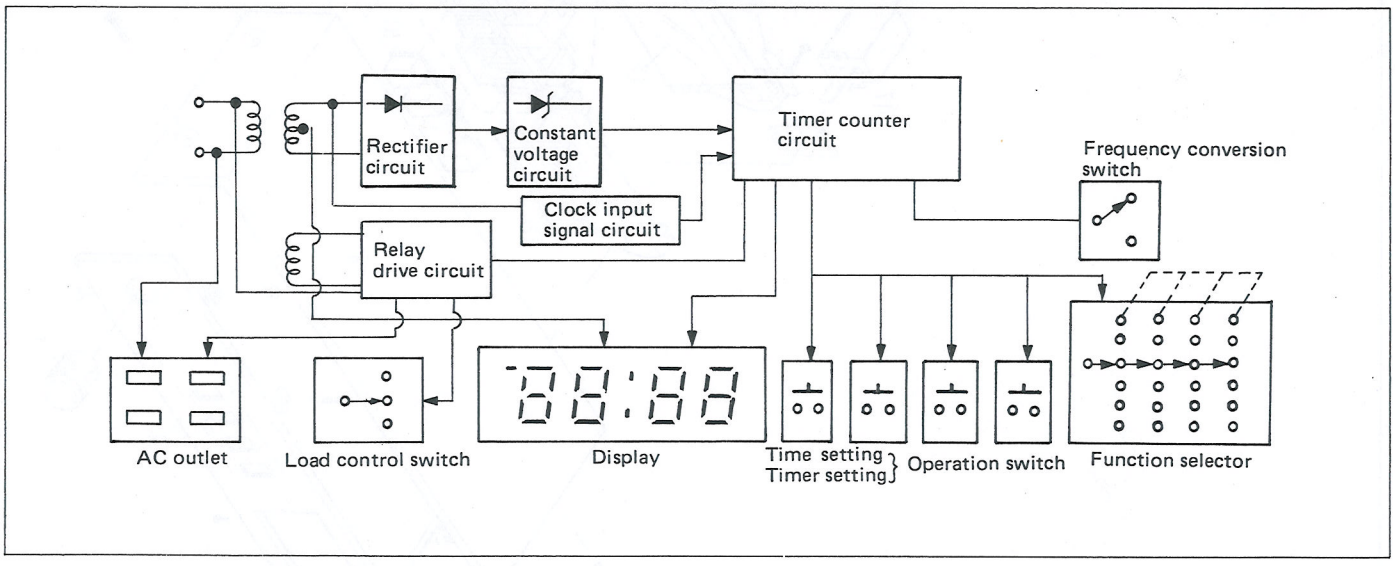
Specifications

Power source:	120V AC, 200V AC, 240V AC 50/60Hz
Power consumption:	5W for operation of timer
Power capacity:	1,100W (220V AC) 600W (110V AC)
Clock accuracy:	Synchronizes with AC power frequency
Timer accuracy:	+0.02 second against preset time
Switch construction:	Double pole-single throw
Dimensions:	65 x 297 x 120mm
Weight:	1,700g



TE972 (light-gold)

CIRCUIT DIAGRAM



Panasonic

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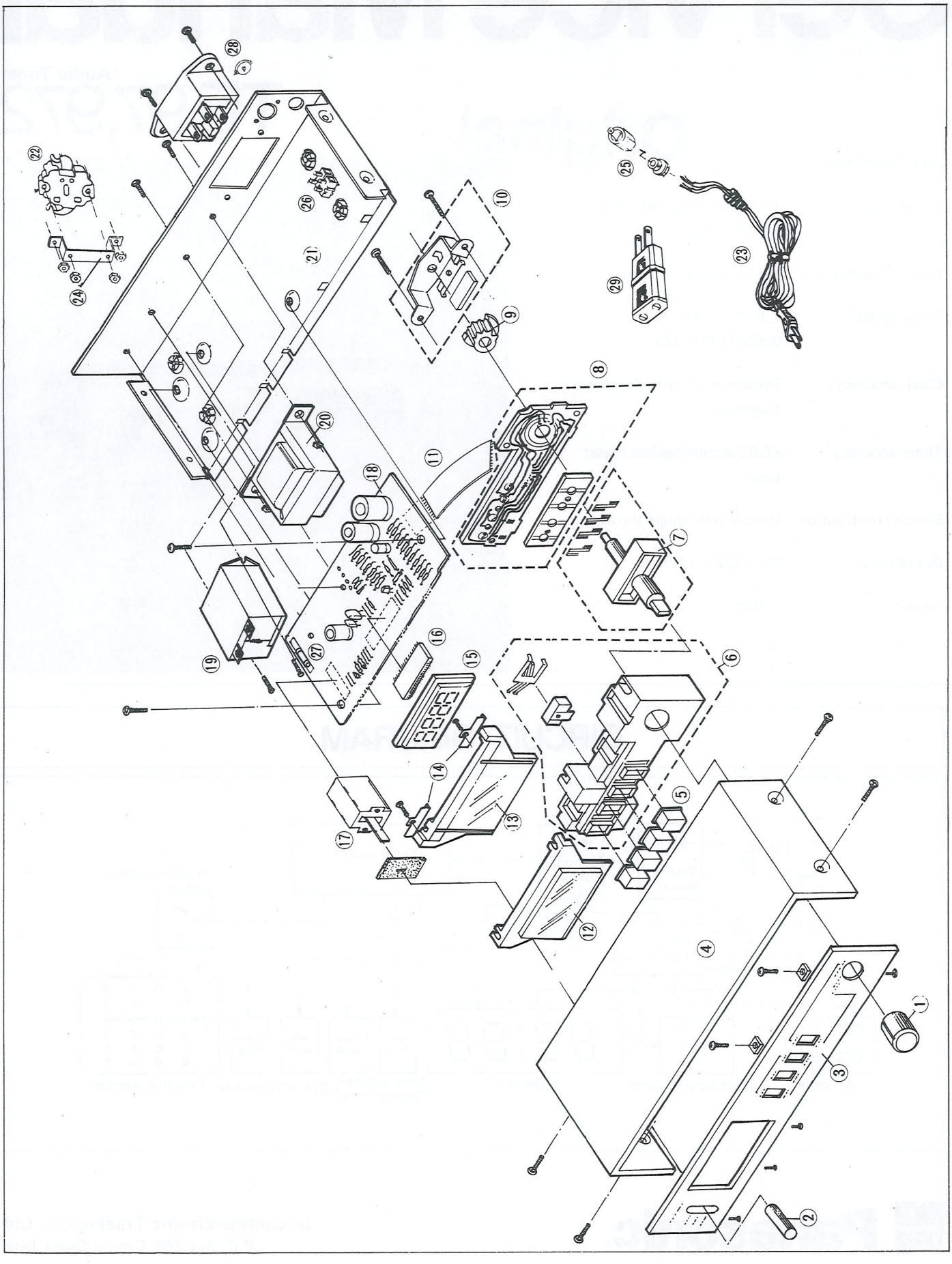
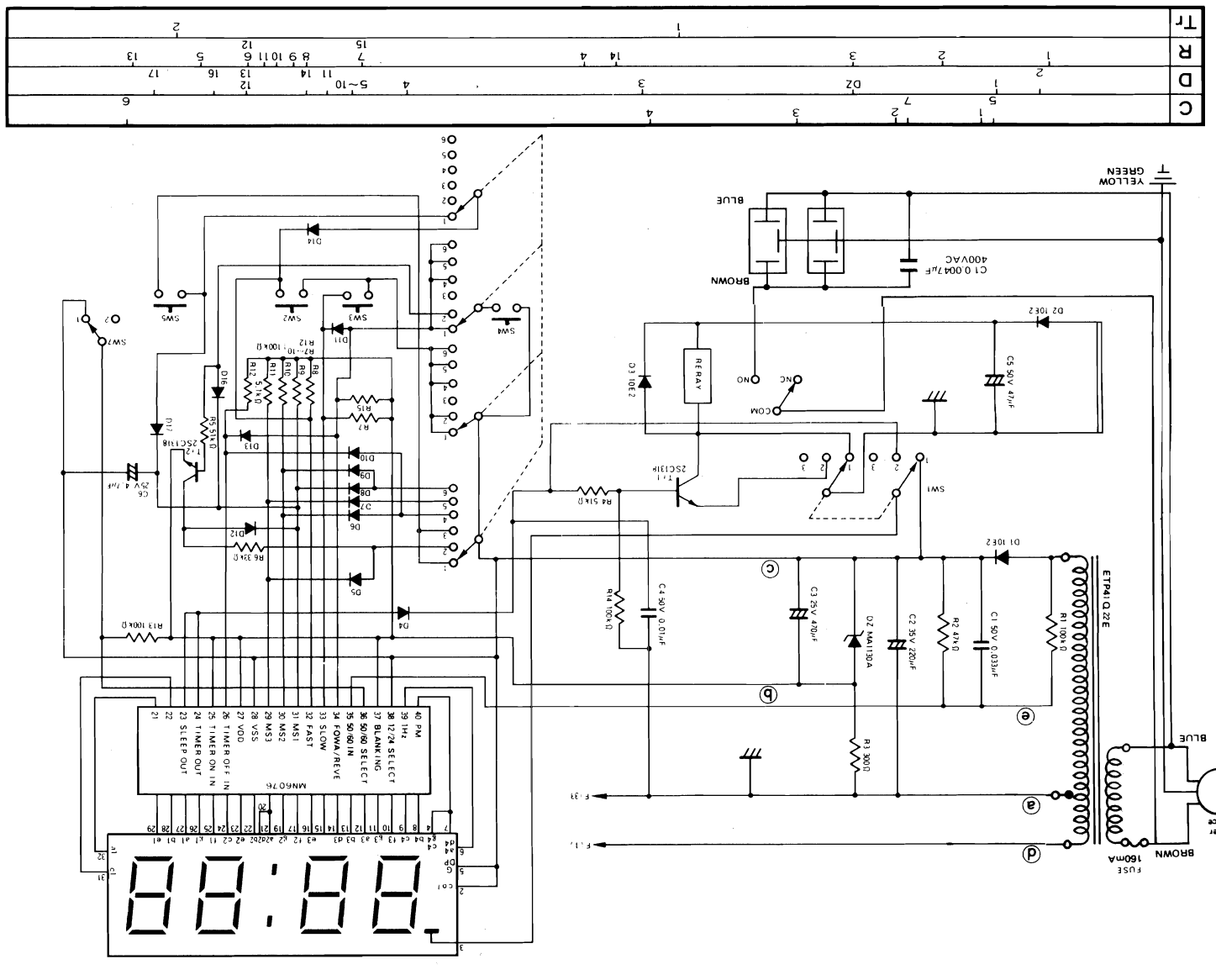
2151

EXPLODED VIEW





Indicator mode list

Selection of mode			Indicator mode
MS3	MS2	MS1	
L	L	L	Basic time (hour, minute)
L	L	H	Basic time (minute, second)
L	H	L	ON-time setting timer
L	H	H	Sleep timer
H	L	L	OFF-time setting timer
H	L	H	Stop watch (hour, minute)
H	H	L	Stop watch (minute, second)

SW identification

No	Item
SW1	1. manual on 2. auto on/off 3. manual off
SW2	fast/reset
SW3	slow /start/hold
SW4	reverse/time check
SW5	sec · check/sec reset
SW6	1. time adjust 2. counter 3. present time 4. on set 5. off set 6. sleep
SW7	1. 50Hz 2. 60Hz

D4 ~ D17 MA150

Printed in Japan

CIRCUIT DIAGRAM

MODEL TE97, 972

MODEL TE97, 972

INSPECTION METHOD

Symptom	Test point	Test item	Oscilloscope Digital: Probe	Oscilloscope Digital: Ground	Normal voltage/wave form	Interpretation of measurement Fault location
*No segment light at all	Ⓐ	Ⓐ Filament Voltage	ⓓ	ⓐ	AC 2.9V	Filament voltage or VSS show no output *Blown fuse *Open power cord *Defective transformer
		Ⓐ VSS	ⓒ	ⓑ	DC 13.0V	
*Some segments do not light *Segments are dim *Segments blink *Unnecessary segments light *Light leakage	Ⓑ	Ⓑ LSI output wave form	① ~ ㉒ ㊵	ⓑ	When there is no light in segment: VDD When there is segment light: VSS, DC 13V, VDD	Segments lit, no LSI output *Defective LSI Segments lit, LSI output exists *Defective display tube Segments not lit, LSI has output *LSI defective, soldering short Segments not lit, no LSI output *Defective display tube
*Second blinker does not light *Second blinker lights during normal time	Ⓒ	Ⓒ LSI output wave form	㊴	ⓑ	When second indicator does not blink When second indicator blinks: VSS, DC 13V, VDD	If the output of LSI at pin 39 at 1Hz does not match the wave form at the left, the LSI is defective.
*Second signal is not transmitted *Clock does not operate Fast advance does not help	Ⓓ	Ⓓ LSI input wave form	㉟	ⓑ	VSS, VSS-1V, Vpp 10 ~ 16V, VDD	When wave form is as shown at left *Defective LSI When wave form is not as shown at left *Check clock input signal circuit
*Relay does not operate at set time *Relay continues to operate at set time	Ⓔ	Ⓔ LSI output wave form	㉓ ㉔	ⓑ	Relay OFF: VDD Relay ON: VSS, DC 13V, VDD	When output wave form is not as shown at left *Defective LSI *Defective transistor Tr1 (2SC1318)

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description	Original Part No.	Per set		
1	TE97003597	Mood selector (silver)		1		
	TE97003597I	Mood selector (black)		1		
2	TE97003607	Switch lever (silver)		1		
	TE97003607I	Switch lever (black)		1		
3	TE97003067K	Front panel (silver)		1		
	TE97003067L	Front panel (black)		1		
	TE97003067J	Front panel (light-gold)		1		
4	TE97003087	Upper case (gray)		1		
	TE97003087I	Upper case (black)		1		
5	TE97003627	Key (ivory)		4		
	TE97003627I	Key (black)		4		
6	TE97003687	Key frame		1		
7	TE97003608	Rotary switch		1		
8	TE97002657	Key plate block		1		
9	TE97001397	Key cam		1		
10	TE97000367	Bracket for rotary switch		1		
11	TE97003457	Block jumper		1		
12	TE97003107	Front filter		1		
13	TE97003068	Second filter (orange for silver model)		1		
	TE97003068I	Second filter (colorless for black model)		1		
14	TE97000217	Bracket for filter		1		
15	TE97002367	Display	4LT14S(Futaba)	1		
16	TE97002387	LSI	MN6076 (M.E. Corp.)	1		
17	TE97002017	Lever switch block		1		
18	TE97002107E	Printed circuit boad		1		
19	TE95005307	Relay (Switherland, England only)		1		
	TE90305308	Relay		1		
20	TE97002237	Power transformer	ETP41Q22E (M.E. Comp.)	1		
21	TE97003097	Lower case A (w/A2 hole)		1		
	TE97003097B	Lower case B (England only)		1		
	TE97003097C	Lower case C (PX only-black)		1		
	TE97003097M	Lower case D (PX only-gray)		1		
	TE97003097E	Lower case E (w/C2 hole)		1		
	TE97003097H	Lower case F (Switherland only)		1		
22	TE97002507	Receptacle A (A2)		2		
	TE90302507B	Receptacle B (England only)		2		
	TE90302507E	Receptacle C (Denmark only)		1		
	TE90302507F	Receptacle D (C2, w/o earth)		1		
	TE90302507G	Receptacle E (C2, w/earth)		1		
	TE90302507H	Receptacle F (Switherland only)		1		
23	TE97002057	Cord A (A2)		1		
	TE95002057A	Cord B (B2)		1		
	TE95002057B	Cord C (w/o plug) England only		1		
	TE95002057C	Cord D (C2) Flat type		1		
	TE95002057E	Cord E (C2) DEMKO approved		1		
	TE95002057F	Cord F (C2) KEMA approved		1		
	TE95002057G	Cord G (C2) w/earth		1		
	TE95002057H	Cord H (C3) Switzerland only		1		
24	TE90300807A	Bracket for receptacle		1		
25	TE95000357A	Bushing		1		
26	TE95003588A	Terminal		1		
27	TE90300317A	Fuse (160mA)	EA160mA (length 20mm)	1		
28	TE90302017A	Voltage-conversion switch (PX only)		1		
29	TE90302217A	Adapter sets (PX only)		1		
30	TE97008107J	Instruction book		1		
31	TE97008007B	Individual box		1		

TROUBLESHOOTING GUIDE

Inspection and maintenance procedure

Symptom	Cause	Method of correction	Check point
Time display related — No light at all	Open power cord	Replace power cord	1. Check for open in power cord
	Display tube is cracked or broken	Replace display tube or Printed circuit base	2. Check for damage to display tube
	Open transformer	Replace transformer	3. Check both primary and secondary of transformer
	Defective transformer lead soldering	Repair soldering	4. Check soldering
Some segments no light	Open pattern	Correct pattern	1. Visual check
	Bad soldering on LSI display tube lead	Correct soldering	2. Check soldering
	Defective LSI	Replace LSI or printed circuit base	3. Check LSI output
	Defective display tube	Replace display tube or printed circuit base	4. Check LSI output
Unnecessary segment lighted, light leakage	Display tube terminals touch	Replace display tube or printed circuit base	1. Check for short of display tube terminals
	Defective LSI	Replace LSI or printed circuit base	2. Circuit inspection Check LSI output
Segments dim	Defective display tube	Replace display tube or printed circuit base	1. Check LSI output
	Defective LSI	Replace LSI or printed circuit base	2. Check LSI output
Segments blink	Defective display tube	Replace display tube or Printed circuit base	1. Check contacts on indicator tube prongs
	Defective LSI	Replace LSI or printed circuit base	2. Check stability of segment output
All segments light	Defective LSI	Replace LSI or printed circuit base	1. This is the case of continuous output at each segment
Incorrect mode displayed	Defective contact of rotary switch	Repair or replacement	1. In case input to 29 30 31 is 13V DC, rotary switch contact defective
	Defective D5 ~ D17 diodes	Replace printed circuit base	2. Check the continuity of diodes D5 ~ D17
Second indicator no light under normal condition	Defective LSI	Replace LSI or printed circuit base	1. Check the LSI output wave form
	Open pattern	Repair pattern	2. Visual check
Clock related — Clock advances	Frequency fluctuation	Obtain automatic frequency corrector from power company	1. Check for increased error
	Wrong frequency	Correct selector switch position	2. Check position of selector switch
Clock runs slow	Frequency fluctuation	Obtain automatic frequency corrector from power company	1. Check for increased error
	Wrong frequency	Correct selector switch position	2. Check position of selector switch
Second signal is not transmitted	R1, R2 resistance values are not rated value	Replace printed circuit base	1. Check resistance value
	C1 capacity is not rated value	Replace printed circuit base	2. Check condenser
	Open pattern	Repair pattern	3. Visual check
Clock does not operate at all, quick advance has no effect	Defective LSI	Replace LSI or printed circuit base	1. Check voltage of input wave-form. Normal voltage is 10 ~ 16V DC (otherwise, deffective)
Timer related — Current flow indicator lights even though set time is not reached — Relay does not operate	T1 transistor defective	Replace printed circuit base	1. Using a continuity checker, check continuity between emitter and collector. If the needle vibrates, the transistor is defective.
Relay operates continuously	T1 transistor defective	Replace printed circuit base	
	Defective LSI	Replace LSI or printed circuit base	2. Check 23 pin or 27 pin LSI output
Operating switch related — Rotary SW does not function	Defective D5 ~ D17 diodes	Replace printed circuit base	1. Check continuity
	Defective LSI	Replace LSI or printed circuit base	2. Check LSI output wave form
	Defective SW contact	Repair or replace SW	3. Check if input to 29 30 31 is DC13V
Pushbutton switch in deffective	Jumper lead soldering short	Repair soldering	1. Check soldering Check for open lead
	Defective D5 ~ D17 diodes	Replace printed circuit base	2. Check continuity
	Defective LSI	Replace LSI	3. Check LSI output
When button is pushed	Jumper lead soldering short	Repair soldering	1. Check soldering Check for open lead
	Defective D5 ~ D17 diodes	Replace printed circuit base	2. Check continuity
	Defective LSI	Replace LSI	3. Check LSI output
Selector SW does not function	Jumper lead soldering short	Repair soldering	1. Check soldering Check for open lead
	Defective D5 ~ D17 diodes	Replace printed circuit base	2. Check continuity
	Defective LSI	Replace LSI	3. Check LSI output
	Defective selector SW	Replace selector SW	4. Check continuity